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Our Contribution to the EuroSafe Imaging Call of Action
Turkish Society of Radiology

Radiation awareness of radiology workers in Turkey

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Introduction

Medical imaging with ionising radiation needs a good level of information for referring physicians, but radiologists and technologists have the ultimate responsibility for optimising radiation exposure. Building awareness of radiation protection in medical imaging began decades ago. The main reason behind this survey-based study was to get a better understanding of a) the current status of the radiation protection education, b) the need for information, c) compare the subgroups and level of knowledge about modalities.

Material and methods

Radiologists (149), radiology assistants (44) and technologists (41) were asked to respond to a survey performed in two consecutive parts with a mobile phone application (65) and then internet survey software (191, a total of 256). Twenty-two responses were removed for redundant responses or incomplete answers (234 applicants rest).

In the survey, 6 of the 21 questions were about the demographics of respondents. Following 6, 4, 3 and 2 multiple choice questions with only one correct answer were for radiation protection issues in general, radiography, CT and fluoroscopy respectively. The survey software was designed so that respondents were not allowed to proceed to the next question without completing the answer. Correct answers were scored as one point for each for 15 questions about radiation protection and total percentages for degree of success were calculated.

Results

It was found that 92, 79 and 55 of the participants were working 6-15 years, more than 15 years and 2-5 years in radiology respectively. Most of them were working for university or education institutions (129/234) and some for state hospitals (66/234). Some participants felt themselves not to be competent in radiation protection (137/234) and most of them got at least one education course for radiation protection (168/234). Half of the participants' institutions had dose measurements for their radiology modalities (118).

Applicants were more than 50% successful in 7 of the 15 questions (3rd, 4th, 7th, 8th, 9th, 11th and 12th). Questions about tissue sensitivity factors from ICRP 103 recommendations, and dose values for standard examinations were the most unsuccessful issues most of the respondents failed. Contents of the 15 questions were summarised in Table.

1. What is the skin entrance dose for an average conventional chest –x-ray film screen combination?	0,1mGy
2. Which tissue sensitivity factor was decreased on ICRP 103 recommendation?	Gonads
3. Which on is the authority for Radiation protection issues in Turkey?	TAEA
4. Which one is not one of the main radiation protection principles	ingestion of abundant vit C and protein
5. Which one is not one of the main radiation protection principles for patient protection?	measurement and evaluation of doses
6. Which one is the main radiation source for the public in developed countries?	background radiation
7. Which one is the main source of medical exposure to the public?	CT
8. What should someone do to decrease the patient dose in radiography?	increased mA protocol
9. Which one does not decrease the pediatric patient dose in radiography?	use of table grid
10. Which one should not be done for the lowest dose for radiologist-technologist in fluoroscopy?	max image/second
11. Which one should not be done for the lowest patient doses in fluoroscopy?	pulling the image receptor to the most remote location
12. Which one should not be done to decrease the CT dose to the patient?	higher kV, mAs and lower pitch
13. How much higher patient dose may be produced with Chest radiography comparing to chest CT?	500
14. How much higher patient dose may be produced with AP abdomen radiography comparing to Chest radiography?	50
15. Which one is the average amount of effective dose to patient for chest CT exam?	5-20 mSv

Tab. 1: List shown below gives the main subject of 15 questions and short answers. One of the four answers was right and applicants could not proceed to the next question without answering the last one.

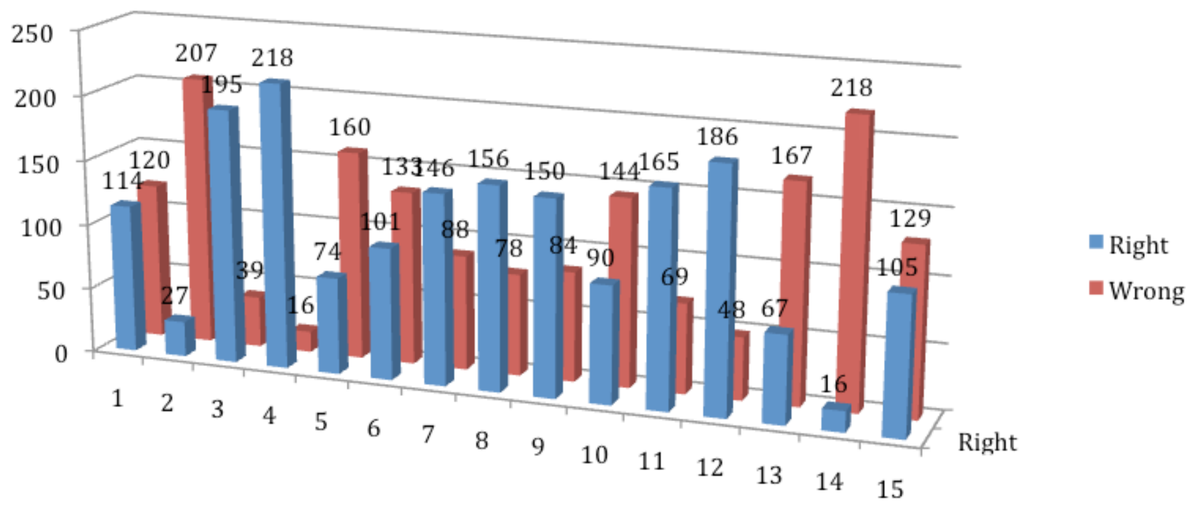

Fig. 1: Table shows the wrong and right answers to each of the 15 questions for a total of 234 applicants. Most of the respondents failed on 2nd, 13th, 14th and 15th questions asking dose levels about radiographic and CT procedures. The fifth question was about principles of radiation protection of the patient.
Fourth question was about main radiation protection and 12th was for decreasing the patient dose on CT.

There was statistically significant difference between the success of radiologists (median 53.3, min 6.7-max 93.3), residents (median 46.7, min 6.7-max 73.3) and technologists (median 46.7, min 66.7-max 80). The main issues of difference between assistants and technologists were in general radiation information (p=0.003). General radiation information, CT and fluoroscopy issues were the subjects radiologists were more successful at compared to the technologists (p=0.002, 0.007 and 0.005 respectively). There was no significant difference between overall success rate and working years, health facility, feeling of competence in radiation safety, having a previous course or dose measurement in their facility. The information level for radiation in general, CT and fluoroscopy between radiologists and technologists were different.

Discussions

Protection of the patient from the possible harms of x-ray should be based on justification of the exam performed with an optimised exposure technique below the diagnostic reference level (DRL) (1). Previous surveys of non-radiologists showed a limited knowledge level about basic information and risks of radiation, even after attendance at educational courses (2). Similar results were detected in radiology professionals (3, 4).

Radiology awareness has been a topic of a few studies in Turkey. Gökçe et al. reported the unsatisfactory success of radiology residents mostly in the dose estimation of different modalities (5).

The information level of radiology professionals was roughly 50% without a significant difference between responses from mobile phones and internet. The results show the need for education should concentrate on radiobiology and dose levels of different x-ray producing modalities. Statistically important differences of knowledge between radiologists/residents and technologists was not apparent in the literature before. No important differences between years of experiences, confidence levels or different kinds of institutions show the necessity of proper education for all radiology staff. An example of success coming after a well-organised education curriculum for undergraduate students may show the direction we should follow (6).

References

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